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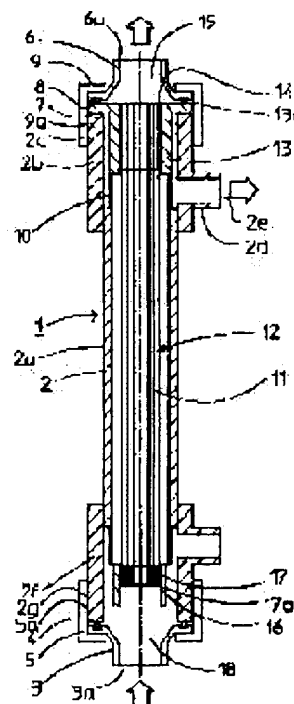
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(54) HOLLOW FIBER MEMBRANE CARTRIDGE AND ITS FIXING STRUCTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To easily suspend and fix a large dimension hollow fiber membrane cartridge in a housing by fixing a cartridge head formed of a material different from that of a bonding section on one bonded end outer periphery of a hollow fiber membrane bundle and forming a collar protruded to the outside in the diameter direction on the cartridge head.

SOLUTION: A hollow fiber membrane cartridge 12 is formed of a number of hollow fiber membranes 11, bonding agent layers 14 and 17, a cartridge head 13 and a skirt member 16. The upper ends of the hollow fiber membranes 11 are opened and their lower ends are closed, and the outer peripheries of the upper ends of a number of hollow fiber membranes 11 are bundled together and their upper end outer peripheries are bonded integrally by a bonding agent to form the bonding agent layer 14, and the bonding agent layer 14 is inserted into the cylindrical cartridge head 13 and fixed on the cartridge head 13. A collar 13a protruded to the outside in the diameter direction is formed on the end face side of a hollow fiber membrane bundle on the cartridge head 13 and the hollow fiber membrane cartridge 12 is suspended and supported on a filter device by the collar 13a.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the hollow fiber cartridge equipped in a filter. It is related with the hollow fiber cartridge used for the filter which performs turbidity reduction and disinfection in large quantities as raw water in more detail in a river water, lake water, an underground water, seawater, domestic wastewater, or industrial liquid waste.

[0002] Furthermore, this invention relates to the fixed structure to the filter of a hollow fiber cartridge.

[0003]

[Description of the Prior Art] Fixation into housing of the conventional small hollow fiber cartridge is performed by putting spittle section 13a of the cartridge head 13 formed in the edge of a hollow fiber 11 with housing head 2b and a cap 6, and fastening it by the band distributor shaft coupling 21 further, as shown in drawing 2 (important section enlarged view). The cartridge head 13 is formed in the housing fixed side of the hollow fiber cartridge 12 used here in one by the adhesives which paste up many edges of the hollow fiber 11 of a book mutually, and spittle section 13a which consists of the same material is prepared in the edge.

[0004] However, comparatively, although the spittle section of a cartridge head upper limit can apply the above-mentioned fixed method to a thin hollow fiber cartridge, since [being applicable to the water treatment which is set as the object of this invention and which is purified in large quantities] the spittle section of this cartridge head upper limit must be thickened in the case of the hollow fiber cartridge of a large-sized size, it cannot apply this technique.

[0005]

[Problem(s) to be Solved by the Invention] The purpose of this invention uses as an offer plug structure of a hollow fiber cartridge of having been suitable for it while offering the structure which hangs and fixes the hollow fiber cartridge of a large-sized size in housing comparatively.

[0006]

[Means for Solving the Problem] this invention solves the aforementioned technical problem. Namely, in housing of (1) filter, this invention hangs and is supported. It is the hollow fiber cartridge which comes to bundle two or more hollow fibers. on one adhesion edge periphery of a hollow fiber bunch The cartridge head which serves as this jointing from a different material is being fixed. And the hollow fiber cartridge characterized by preparing the spittle section projected on the direction outside of a path in the cartridge head, And it is the fixed structure which hangs and supports a hollow fiber cartridge in housing of (2) filters. It is related with the fixed structure which it comes to put with a housing head with the bell-and-spigot cap who fits into the male screw with which the spittle section of the cartridge head of a hollow fiber cartridge upper limit was stopped, and the spittle section was formed in the housing head periphery on the housing head of a filter.

[0007] Into the tank type filter which performs turbidity reduction and disinfection of a lot of raw water, and a rack type filter, the hollow fiber cartridge of this invention is hung and fixed, and is used.

Moreover, the fixed structure of this invention is preferably used, in case a hollow fiber cartridge is

fixed in a rack type filter.

[0008]

[Embodiments of the Invention] Hereafter, the example of the fixed structure into the hollow fiber cartridge which starts this invention with a drawing, and its housing is explained. Drawing 1 is cross-section explanatory drawing showing an example of the hollow fiber cartridge concerning this invention hung and supported in housing of a rack type filter.

[0009] the hollow fiber cartridge 12 of this invention shown in drawing 1 -- a large number -- the hollow fiber 11 of a book, the adhesives layers 14 and 17, the cartridge head 13, and a skirt board -- it consists of members 16 As for a hollow fiber 11, opening of the upper-limit section is carried out, the soffit section is blockaded, many hollow fibers 11 of a book were bundled, the upper-limit outside periphery was combined in one by adhesives, the adhesives layer 14 was formed, the adhesives layer 14 was further fitted in the interior of the cylindrical shape-like cartridge head 13, and it has fixed on the cartridge head 13 with adhesives.

[0010] Spittle section 13a projected on the cartridge head 13 on the direction outside of a path is prepared in the end-face side of a hollow fiber bunch. Since the hollow fiber cartridge of this invention is hung and supported by the filter by spittle section 13a of this cartridge head, the spittle section consists of what it must be the thickness which bears a self-weight and internal pressure (water pressure) of a cartridge, and the material also excelled in intensity.

[0011] hollow fibers combine the other-end section of a hollow fiber 11 in one with adhesives -- having -- a skirt board -- although it is combined in one in a member 16 and the adhesives layer 17 is constituted, the edge of a hollow fiber 11 is closed And raw water and the gas for washing are introduced into the interior of a hollow fiber bunch, and two or more through-hole 17a for making it contact to a hollow fiber peripheral face effectively is formed in the adhesives layer 17. a skirt board -- a member 16 is projected from a hollow fiber bunch end face, and is being fixed to the adhesives layer

[0012] moreover, it is shown in drawing 1 -- as -- the cartridge head 13 and a skirt board -- there is no outer case case which was established conventionally in the periphery of 11 bundles of hollow fibers between members 16, and the hollow fiber in the meantime covered the overall length mostly, and is exposed with nakedness As a hollow fiber 11 used for this invention, a micro filter, a ultrafiltration membrane, a reverse osmosis membrane, etc. are usable. Moreover, especially the material of the hollow fiber 11 used for this invention is not limited, but a polysulfone, polyether sulphone, a polyimide, polyether imide, a polyamide, a polyether ketone, a polyether ether ketone, polyethylene, polypropylene, a Polly 4 methyl pentene, a cellulose, cellulose acetate, a polyvinylidene fluoride, a polyethylene tetrafluoroethylene copolymer, a polytetrafluoroethylene, etc. are mentioned. Or these compound material films can also be used. Moreover, as a configuration of hollow ****, it is 50 micrometers - 3000 micrometers in bore, and inside/outside clearance ratio can use the film of the range of 0.3-0.8.

[0013] As adhesives used for this invention, polymeric materials, such as an epoxy resin, a urethane resin, an epoxy acrylate resin, and a urethane resin, are applicable. When it desires hardening contraction of adhesives, and an improvement of intensity, you may make the above-mentioned binder contain pulverized coals, such as fibrous objects, such as glass fiber and a carbon fiber, carbon black, an alumina, and a silica.

[0014] Although it will not be limited especially if the cartridge head 13 of this invention is a different material from the above-mentioned adhesives, thermoplastics and stainless steel are used preferably. Although you may differ even if the material of a skirt board 16 is the same as that of the cartridge head 13, thermoplastics and stainless steel are desirable. The manufacture method of the hollow fiber cartridge of this invention inserts in the cartridge head 13 the hollow fiber bunch which filled one edge centrum, slushes adhesives, carries out adhesion fixation of hollow fibers and the cartridge head 13 fluid-tight, cuts a hollow fiber and an adhesives layer simultaneously, and carries out opening of the hollow fiber end face. the ** to which the hollow fiber edge of another side does not fill a centrum -- a skirt board -- it inserts into a member 16 and the predetermined rod for forming through-hole 17a in a hollow fiber bunch further or a board is set and a skirt board -- the inside of a member 16 -- adhesives -- slushing -- hollow fibers and a skirt board -- adhesion fixation of the member 16 is carried out At this

time, the centrum of a hollow fiber edge is simultaneously closed by adhesives. Then, the rod for through-hole 17a formation or a board is taken out from an adhesives layer, and through-hole 17a is formed. after [moreover,] setting the rod for through-hole 17a formation, or a board in a hollow fiber bunch, carrying out adhesion fixation and taking out the fixture for through-hole 17a formation -- the periphery of the adhesion fixed bed -- a skirt board -- you may fix a member 16 from adhesion or welding

[0015] Next, the hollow fiber cartridge 12 concerning this invention is explained about the structure fixed into housing 2. In drawing 1, 1 is applicable to the water treatment which is the example of the rack type filter which filters by supplying an undiluted solution, for example, purifies domestic wastewater, a river water, lake water, an underground water, or seawater in large quantities as raw water.

[0016] Although drawing 1 explains the case where the hollow fiber cartridge concerning this invention is applied to the rack type filter of the so-called cross-flow filtration method which circulates through an undiluted solution, it is also possible to apply to the so-called rack type filter of all the filtration methods that filter without circulating through an undiluted solution. The housing section of the rack formula filter 1 consists of a housing main part 2, vertical bell-and-spigot caps 5 and 9, and vertical caps 3 and 6. Furthermore, the housing main part 2 consisted of pipe 2a and up-and-down housing heads 2b and 2f, and the housing head of a pipe and the upper and lower sides has fixed it airtight-wise and fluid-tight by welding or adhesion, respectively.

[0017] In addition, although the case where the upper bell-and-spigot cap 9, the upper cap 6, and the lower bell-and-spigot cap 5 and the lower cap 3 are division, respectively is shown in drawing 1 as a desirable operation gestalt, it is also possible to also apply the gestalt from which the bell-and-spigot cap and the cap became one apparatus as other operation gestalten. Connection support is carried out with piping which is not arranged and illustrated in the upper part and the lower part, and the vertical caps 3 and 6 of the rack formula filter 1 are set up by fixed support means in the band which the housing main part 2 does not illustrate if needed further.

[0018] By making 2g of male screws formed in lower housing head 2f in the state where put O ring 4 between lower housing head 2f and the lower cap 3, and it was crowded, and female screw 5a prepared for the lower bell-and-spigot cap 5 fit in, lower housing head 2f and the lower cap 3 are fixed airtight-wise and fluid-tight. Moreover, where packing 7 is put between upper housing head 2b and the spittle section 13a inferior surface of tongue of the cartridge head 13 In and the state where put O ring 8 and it was crowded between the upper cap 6 and the cartridge head 13 upper surface By making male screw 2c prepared in upper housing head 2b, and female screw 9a prepared for the upper bell-and-spigot cap 9 fit in, it is fixed airtight-wise and fluid-tight between upper housing head 2b and the cartridge head 13 and between the upper cap 6 and the cartridge head 13.

[0019] According to the above-mentioned fixed structure, the hollow fiber cartridge 12 which bundled two or more hollow fibers 11 in the housing 2 of the rack type filter 1 hangs, and it is supported. The building envelope of the rack type filter 1 is divided into two locus by the cartridge head 13 of the hollow fiber cartridge 12. The treated-water room 19 is formed from the space which the feedwater room 18 was formed by this of the space formed of the housing main part 2 and the cartridge head 13, and was formed of the cartridge head 13 and the upper cap 6.

[0020] 2d is mostly prepared in the right-angled direction for the horizontal nozzle, and the outlet is set to circulating water mouth 2e at the time of operating filtration at upper housing head 2b, circulating through an undiluted solution. Moreover, the upper housing head 2b wall is equipped with the perforated plate 10 in order to suppress length ***** of the hollow fiber 11 by circulating water. Especially the material of pipe 2a used for this invention, the housing heads 2b and 2f, the bell-and-spigot caps 5 and 9, and caps 3 and 6 is not limited, and even if it is the same, they may differ, and they can apply thermoplastics and stainless steel preferably.

[0021] while it is [raw water / which was supplied to the feedwater room 18 in the above-mentioned composition from raw water mouth 3a of the lower cap 3 of rack type filter 1 lower part from the pump which is not illustrated at the time of filtration operation by the rack type filter 1] full of the feedwater

room 18 -- a skirt board -- it is led to the periphery side of a hollow fiber 11 through through-hole 17a of the adhesives layer 17 from a member 16 After passing the perforated plate 10 by which the part passed the periphery section of a hollow fiber 3 as it was, and was prepared in the inside of upper housing head 2b, it is led to circulating water mouth 2e from horizontal nozzle 2d prepared in upper housing head 2b. [0022] And the raw water near the periphery section of a hollow fiber 11 is led to the treated-water room 19 from the upper-limit section to which it was pressurized and filtered inside the external shell of a hollow fiber 11, and opening of the hollow fiber 11 was carried out. The filtered water held in the treated-water room 19 is taken out from treated-water mouth 6a of the upper cap 6 upper part by the exterior of the rack type filter 1. When carrying out the back wash of the hollow fiber 11 by filtered water, supply filtered water from treated-water mouth 6a, the feedwater room 18 is made to flow backwards, the suspended solid (nontransparent object) accumulated in hollow fiber 11 outer wall is eliminated, and it discharges to the exterior of the rack type filter 1 from raw water mouth 3a prepared in the lower part of the rack type filter 1, and circulating water mouth 2e.

[0023] The fixed structure into the housing 2 of the hollow fiber cartridge 12 concerning this invention is further explained to a detail. Male screw 2c is formed in the upper housing head 2b periphery. Since the outer diameter of spittle section 13a of the cartridge head 13 in the hollow fiber cartridge 12, the upper cap's 6 outer diameter, and the outer diameter of upper housing head 2b are manufactured by the almost same size, where the upper cap 6 and the cartridge head 13 are put, they can fit in male screw 2c of upper housing head 2b, and the upper bell-and-spigot cap's 9 female screw 9a. Furthermore, parallel are made to the spittle 13a undersurface of the cartridge head 13, the upper housing head 2b upper surface and the cap 6 undersurface, and the cartridge head 13 upper surface, respectively.

[0024] By inserting the hollow fiber cartridge 12 into housing, spittle section 13a of the cartridge head of the hollow fiber cartridge 12 is stopped by the housing head. Furthermore, between upper housing head 2b and the cartridge heads 13 and between the upper cap 6 and the cartridge heads 13 are fixable airtight-wise and fluid-tight by making male screw 2c of upper housing head 2b, and the upper bell-and-spigot cap's 9 female screw 9a fit in through packing 7 and O ring 8.

[0025] In addition, in the aforementioned operation form, packing 7 and O ring 8 can be used alternatively suitably, and it is also possible to also apply an O ring between upper housing head 2b and the cartridge head 13, and to apply packing between the upper cap 6 and the cartridge head 13.

Comparatively, in the case of the hollow fiber cartridge of a large-sized size, the area of the upper surface of this hollow fiber cartridge 12 becomes large with large-diameter-izing of the hollow fiber cartridge 12, and the load which joins the upper surface of this hollow fiber cartridge 12 with the internal pressure (water pressure) applicable to the water treatment which is set as the object of this invention, and which is purified in large quantities which joins the treated-water room 19 interior becomes large. Moreover, the load by which the self-weight of the hollow fiber cartridge 12 joins the upper surface of increase and this hollow fiber cartridge 12 becomes large with enlargement of the hollow fiber cartridge 12. When using it under the conditions that internal pressure is higher than usual, the load which joins the upper surface of this hollow fiber cartridge 12 similarly becomes large. The above-mentioned load needs to thicken spittle section 13a, in order to mainly act on spittle section 13a of the cartridge head 13 as shearing stress, and to increase the withstand load of a cartridge head.

[0026] According to the above-mentioned structure of this invention, by lengthening the bell-and-spigot cap's 9 female screw 9a, it is possible to make the thick cartridge head 13 of spittle section 13a fit in, and this technique is the fixed structure which can be applied also to the hollow fiber cartridge 12 of the thick large-sized size of spittle section 13a of the cartridge head 13. When a size is a small cartridge about 3 inches or less, the fasten lump by band distributor shaft coupling as been about 5mm or less, enough come out of and shown in drawing 2 for a certain reason is possible for the thickness of spittle section 13a. on the other hand, it is applicable to the water treatment which is set as the object of this invention and which is purified in large quantities -- since spittle section 13a of the cartridge head 13 becomes thick comparatively in the case of the hollow fiber cartridge of a large-sized size, the fixed structure of drawing 2 is inapplicable

[0027]

[Effect of the Invention] since this invention has the composition and the operation like ****, it is applicable to the water treatment purified in large quantities -- it is comparatively applicable to the hollow fiber cartridge of a large-sized size Moreover, the fixed structure of this invention is preferably applicable to fixation into the housing 2 of the hollow fiber cartridge 12 with the comparatively thick thickness of spittle section 13a of cartridge head 13 upper limit.

[0028] Moreover, when a suspended solid is superfluously accumulated to a hollow fiber 11 and stops maintaining a predetermined filtration efficiency at it, according to the fixed structure of this invention, a hollow fiber cartridge can be easily exchanged from housing.

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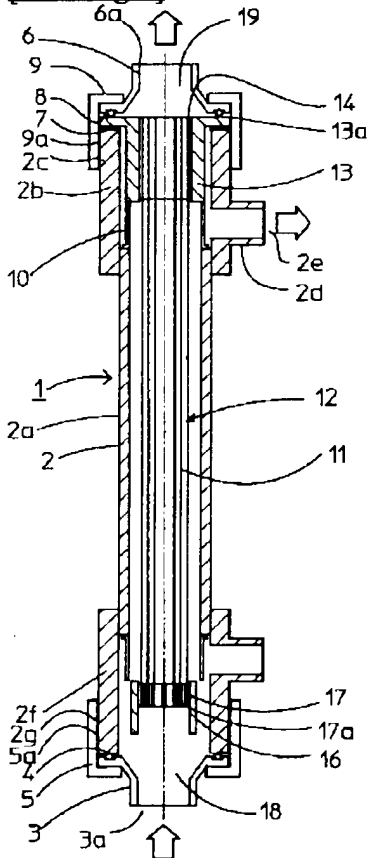
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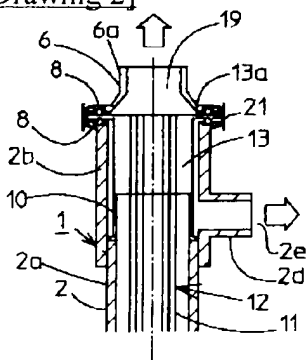
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DRAWINGS

[Drawing 1]



[Drawing 2]



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